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Alang-alang (Imperata cylindrica)

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Click on the "Nutritional aspects" tab for recommendations for ruminants, pigs, poultry, rabbits, horses, fish and crustaceans



Common names

Alang-alang, blady grass, cogon, cogongrass, kunai grass, cotton wool grass, imperata, japanese blood grass, speargrass, red baron [English]; herbe à paillotte, impérate cylindrique, paille de dys [French]; cisca [Spanish]; caniço-branco, caminhadora, sapé [Portuguese]; Japans bloedgras [Dutch]; Silberhaargras [German]; alang-alang, ilalang [Indonesian]; lalang [Malay]; mtimbi [Swahili]; kugon [Tagalog]; Cỏ tranh [Vietnamese]; 白茅 [Chinese]; チガヤ [Japanese]; หญ้าคา [Thai]

Species

Imperata cylindrica (L.) P. Beauv. [Poaceae]

Synonyms

Imperata arundinacea Cirillo, *Imperata cylindrica* subsp. *koenigii* (Retz.) Masam. & Yanagita, *Imperata cylindrica* var. *koenigii* (Retz.) Perkins, *Imperata cylindrica* var. *major* (Nees) C. E. Hubb., *Imperata koenigii* (Retz.) P. Beauv., *Imperata koenigii* var. *major* Nees, *Lagurus cylindricus* L., *Saccharum koenigii* Retz.

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Description

Imperata cylindrica (L.) P. Beauv., known as speargrass in Nigeria, alang-alang in Asia, and cogongrass in America (Labrada, 2003), is a perennial rhizomatous grass, up to 1.2 m high. It has tough, branched and rhizomatous roots that explore soil layers down to 60 cm. Its stems are slender and originate from the upper rhizomes. Leaves are narrow, rigid, blade-shaped, up to 1 m long, 3-10 mm broad, bearded at the base and glabrous in their upper part. Flowers are borne in a 60 cm-long cylindrical, silky and spike-like panicle. The spikelets are surrounded by 10-15 mm long hairs that cause the silky aspect (Ecoport, 2010).

Imperata cylindrica is mostly used in pasture for ruminants. The hay is used for thatch rather than for fodder (FAO, 2010).

Distribution

Imperata cylindrica is native to and widespread within most tropical areas of the world. It was naturalized in Australia, New Zealand, Central and South America but also in southern states of the USA, West Indies, Cape Verde, Madagascar, Melanesia and Polynesia (USDA, 2010). It grows well between 45°N and 45°S and from sea level up to 2000 m in the Himalayas, in sub-humid or humid grasslands or open woodlands. It occurs generally in damp conditions adjacent to swampy areas and drainage lines. Optimal growth conditions are 25°C-35°C day temperatures, 250-6250 mm annual rainfall, full sun or light shade on light sandy soils of pH ranging from 4 to 7.5. It is tolerant of long drought periods and can bear burning since its rhizome allows rapid regrowth. *Imperata cylindrica* cannot withstand flooding (which is a way of controlling it) and low temperatures (growth is stopped below 20°C) (Ecoport, 2010; FAO, 2010; Ecocrop, 2010; Jonathan et al., 1999).

Forage management

Imperata cylindrica is used as pasture when young, at 15-25 cm high. It does not bear heavy grazing (FAO, 2010). In any case, it has to be grazed at low stocking rates as heavy grazing encourages weed invasion (Falvey, 1977).

While *Imperata cylindrica* is usually grazed, it has been proposed to pelletize it for cattle (Pomplona, 1974).

Environmental impact

Imperata cylindrica is a component of native pastures and its grasslands cover more than 200 million ha in Asia. It is considered as a major noxious weed in more than 70 countries, and invades 35 different crops including rice, cotton, coffee, tea, oil palm, coconut and rubber plantations (GISD, 2010). It is difficult to control. Chemical methods are generally used (Gbehounou et al., 2000), but more sustainable practices are being investigated such as mechanical control (Gbehounou et al., 2000), shade-based control (Macdicken et al., 1996), flooding (FAO, 2010) and heavy grazing (Ecocrop, 2010 (FAO, 2010). *Imperata cylindrica* is fire-resistant due to its persistent underground rhizomes and its current dominance in certain areas is thought to have been caused by slash-and-burn agriculture (Falvey, 1981). It competes very successfully with other species. Calopo (*Calopogonium mucunoides*), *Stylosanthes guianensis* and velvet bean (*Mucuna pruriens*) may reduce its invasiveness but some constraints of *Mucuna* cultivation limit its efficiency (Gbehounou et al., 2000; Friday et al., 1999; Sajise et al., 1975).

Imperata cylindrica may be useful for soil erosion control due to the fast growth of its rhizomes. It may also have some potential in silvi-pastoralist systems as it can grow in a relatively low light. For example it is a suitable grass in coconut plantations (Senanayake, 1995).

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Nutritional attributes

Imperata cylindrica is a poor quality grass. Its protein content is about 7% DM and generally lower than 12% DM (Feedipedia, 2013). It is also deficient in energy and sodium (Falvey, 1981).

Potential constraints

Cattle tend to avoid mature leaves due to their sharp tips and edges that cause mouth irritation (Soerjani, 1970).

Ruminants

Though *Imperata cylindrica* pastures may be used profitably in some situations, they must be supplemented with other pasture species and feeds to obtain acceptable animal performance (Falvey, 1981; Holmes et al., 1980). In the Thai Highlands, *Imperata cylindrica* provides some forage but tends to decline or disappear if continually grazed by cattle (Andrews, 1983).

Nutritive value

It has been estimated that the low protein content of *Imperata cylindrica* forage can support live weight gain in beef cattle only for the first 6 weeks of forage growth (Papua New Guinea) or 20 weeks (Thai Highlands) (Falvey, 1981). Nylon bag digestibility of *Imperata cylindrica* was found to be 2/3 lower than that of buffel grass (*Cenchrus ciliaris*), *Setaria sphacelata* and elephant grass (*Pennisetum purpureum*) (Holmes et al., 1980). In the Thai Highlands, *in vitro* digestibility declined with plant age, from 70% when young to 40% at 150 days, and depended on the season: 50-70% for wet season regrowth and lower than 45% in the dry season (Falvey, 1981).

Palatability

Imperata cylindrica is palatable if cut frequently but the mature leaves are sharp and irritating (see **Potential constraints** above) (Soerjani, 1970).

Beef cattle

Imperata cylindrica pastures can support a viable extensive cattle production system provided that they are supplemented with sources of energy (carbohydrates such as cassava), nitrogen (urea or legumes), and minerals (Falvey, 1981; Holmes et al., 1980; Soewardi et al., 1974). Weight gains of cattle grazing non-supplemented *Imperata cylindrica* were reported to be lower than those obtained with supplemented *Imperata cylindrica* pasture, or with other pasture species at higher stocking rates.

Using urea-molasses-mineral blocks and introducing new fodder species (especially legumes) significantly improved production from *Imperata cylindrica* grasslands in smallholder farming systems. Fodder species for fallow improvement, modified alley cropping or hedgerow systems and plantations integrating livestock production may help to increase sustainability (Calub et al., 1996).

The following table presents several trials involving *Imperata cylindrica* pastures.

Animal	Region	Average daily gain and stocking rate for *Imperata cylindrica*	Average daily gain and stocking rate for other forage species or supplemented *Imperata cylindrica*	Reference
Heifers	Papua New Guinea	0.2-0.25 kg/day, 0.8-1.6 animal/ha	0.45 kg/day, 1.7-2.2 animals/ha on Guinea grass and legume pastures	Holmes et al., 1980
Steers	Papua New Guinea	0.38 kg/day	0.47-0.52-0.63 kg/day when supplemented with palm kernel meal alone, with molasses or with molasses and urea 0.53-0.56-0.54 kg/day when supplemented with palm kernel meal alone, with molasses or with molasses and urea	Galgal et al., 2000
Cattle	Philippines	0.27 kg/day, 1 animal/ha	>0.81 kg/day, 2 animal/ha on *Brachiaria mutica*/centro pasture	Magadan et al., 1974
Cattle	Thai Highlands	0.04 kg/day	+30% with sodium supplementation	Falvey, 1981
Cattle	Thai Highlands	0.04 kg/day	0.21 kg/day with legume supplementation, 0.24 kg/day with urea-molasses and mineral block	Mikled, 1976
Cattle	Indonesia	0.17 kg/day	0.21 kg/day with urea, carbohydrate and mineral supplementation	Soewardi et al., 1974

Sheep and goats

Supplementing *Imperata cylindrica* with legumes is a valuable strategy in small ruminants. Dry matter intakes of 2.8 and 3.3 % LW (for goats and sheep respectively) were obtained using alang-alang grass (*ad libitum*) and Leucaena leucocephala (300 g). These values were higher than those obtained for *I. cylindrica* or *Leucaena* alone. Diet digestibility of the low-quality herbage was higher for goats than for sheep (Komolong et al., 1988).

Pigs

Early researchers noted that the succulent white and starchy rhizomes were eaten and even actively searched for by pigs (Hole, 1911). However, later attempts to fatten pigs on the rhizomes have failed as the pigs lost weight (Hubbard, 1944).

Poultry

The composition of *Imperata cylindrica* makes it unsuitable as feed ingredient for poultry. However, in an experiment on young chickens, supplementation of small quantities (2 to 6% DM) of *Imperata cylindrica* to the basal diet resulted in improved performance (Kencana et al., 1980).

Rabbits

No information found (2013).

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Tables of chemical composition and nutritional value

- Alang-alang (Imperata cylindrica), aerial part, fresh
- Alang-alang (Imperata cylindrica), hay

Avg: average or predicted value; SD: standard deviation; Min: minimum value; Max: maximum value; Nb: number of values (samples) used

Alang-alang (Imperata cylindrica), aerial part, fresh

Main analysis	Unit	Avg	SD	Min	Max	Nb
Dry matter	% as fed	31.9	5.0	23.8	39.2	16
Crude protein	% DM	6.5	2.0	3.5	11.2	21
Crude fibre	% DM	39.4	4.1	32.1	44.9	21
NDF	% DM	74.3	2.8	70.1	77.2	7 *
ADF	% DM	45.7	1.8	41.5	46.8	7 *
Lignin	% DM	6.6	0.9	6.6	10.2	7 *
Ether extract	% DM	1.9	0.5	1.3	3.0	21
Ash	% DM	7.0	1.4	4.7	9.0	21
Gross energy	MJ/kg DM	18.6				*

Minerals	Unit	Avg	SD	Min	Max	Nb
Calcium	g/kg DM	3.3	3.5	0.9	17.4	19
Phosphorus	g/kg DM	1.4	0.6	0.4	2.6	19
Potassium	g/kg DM	11.7	5.3	3.6	19.1	15
Sodium	g/kg DM	0.2	0.2	0.1	0.5	3
Magnesium	g/kg DM	2.1	1.0	0.9	4.2	13
Manganese	mg/kg DM	89	79	18	193	4
Zinc	mg/kg DM	13	4	9	19	4
Copper	mg/kg DM	3	1	3	4	4

Ruminant nutritive values	Unit	Avg	SD	Min	Max	Nb
OM digestibility, Ruminant	%	57.2				*
Energy digestibility, ruminants	%	54.7				*
DE ruminants	MJ/kg DM	10.1				*
ME ruminants	MJ/kg DM	8.2				*
Nitrogen digestibility, ruminants	%	30.0				1

The asterisk * indicates that the average value was obtained by an equation.

References

CIRAD, 1991; Laksevela et al., 1970; Lim Han Kuo, 1967; Nasrullah et al., 2003; Pozy et al., 1996; Senanayake, 1995

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Alang-alang (Imperata cylindrica), hay

Main analysis	Unit	Avg	SD	Min	Max	Nb
Crude protein	% DM	3.8				1
Crude fibre	% DM	39.7				1
NDF	% DM	74.6				*
ADF	% DM	46.0				*
Lignin	% DM	6.7				*
Ether extract	% DM	0.7				1

Ash	% DM	7.8				1
Gross energy	MJ/kg DM	18.0				*

Ruminant nutritive values	Unit	Avg	SD	Min	Max	Nb
OM digestibility, Ruminant	%	52.9				*
Energy digestibility, ruminants	%	49.5				*
DE ruminants	MJ/kg DM	8.9				*
ME ruminants	MJ/kg DM	7.2				*
Nitrogen digestibility, ruminants	%	34.0				1

The asterisk * indicates that the average value was obtained by an equation.

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Sen, 1938

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